

tified with living species when palæontologists work in unison with naturalists, or when conchologists become acquainted with both kinds of species. This is a great desideratum; and for want of it several eminent palæontologists (Nyst, Hörnes, and others) made regrettable mistakes in such identification, having been misled by names and not things. We may observe that Gastropoden, instead of Gasteropoden, is the more correct and usual spelling of the word. The plates, sixteen altogether, are admirably executed; and the publication does great credit to the Imperial Institute of Geology at Vienna.

J. GWYN JEFFREYS

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Winter of 1881-82

You have given some figures about the winter of 1881-82 in Great Britain. It was relatively much warmer here. The mean temperatures and its variation from average for November, 1881, to April, 1882, was:

	Nov.	Dec.	Jan.	Feb.	March.	April.
Mean ...	32°0	23°2	29°5	25°0	31°5	38°2
Diff. from average	+2°7	+3°1	+14°5	+8°4	+8°0	+3°1

The general character of these months is thus a very decided high temperature. That of January was the warmest on record in the 130 years' observation. If we take the mean of the three months, January, February, and March, it is also the highest on record, viz., 28°7; the other years in which these three months had the highest temperature were: 1822, 28.1; 1863, 27.4; 1843, 26.9; 1794, 26.6. The temperature of the five months, November to March, viz., 28.2 in 1881-82, was surpassed only once, in 1821-22, 29.3; the other years when these months were warmest are: 1842-43, 27.6; 1761-69, 27.1; and 1826-27, 26.9.

The Neva was frozen less than four months, while on the average the ice lasts nearly five months (147 days), and in the winter of 1880-81 the river was frozen 184 days, the longest time on record since the observations began, that is, for about 175 years. The date of opening of the river this year, March 30, is the earliest, except that of 1822 (March 18).

The last winter is, besides, noticeable for its deficiency of snow, there being scarcely ten days of fair sleighing. The precipitation of the months from November to March was 1"9 less than the average, that of December alone by 0"8, that is, by nearly two-thirds. Besides, a large part of it fell as rain. On account of the want of snow, the rivers had not their ordinary spring floods, and great quantities of timber, prepared to be floated for the use of St. Petersburg, could not be moved.

On the middle and lower Volga, the snowfall of last winter was excessive, and even Taschkent and the valley of Ferghana, in Central Asia (lat. 40°-42°), had an exceedingly cold winter, with permanent and deep snow. The winter was also very cold in Transcaucasia, the minimum temperature in November, 1881, being lower than ever observed before in Tiflis.

St. Petersburg, May 27

A. WOEIKOF

The Mean Temperature of the Atmosphere at the Surface of the Earth as Determined by Observations and by Theory

WHEN several people, not knowing each other, arrive at the same results, the one by compilation and computation of observations, the others by theory, these results present a good probability of correctness, and the theory involved ought to be of interest to science.

In NATURE, vol. xxv, p. 395, I read—"The temperature of the southern hemisphere has lately been investigated by Dr. Hann with the aid of recent observations of temperature in high

southern latitudes, especially those made during the Venus transit in 1874. For mean temperature of the whole atmosphere he obtains 15°4 C., and as that of the northern hemisphere was estimated by Ferrel to be 15°3 C., it is very probable that both hemispheres have the same mean temperature. Dr. Hann, however, also shows that between 40° and 45° south latitude, the southern hemisphere becomes warmer than the northern in the same latitude, and that a difference between the two persists at least to the confines of the hypothetical antarctic continent. . . ."

In "On some Properties of the Earth," 1880 (Wertheimer and Lea, publ.) occur the following passages, founded on and connected by theory alone (p. 95):—"We thus find the average temperature of the atmosphere at the surface of the earth to be 20° C., the isotherms of 20° C. having in their mean the parallels of 30° for basis; this figure, obtained by reasoning, is confirmed by isothermal maps. We will see why the 20° are lowered to 15°22 C., the true mean temperature of the atmosphere at the surface of the earth."

And on pp. 123 to 126: "The line of greatest heat is in the mean moved $\frac{1}{29.78} + \frac{1}{175}$ of the sphere, or 3° 58' + 4' latitude, north of the equator. Temperature is therefore in a compressed or higher state in the lower latitudes of the north." . . .

"Inside the isotherms with the parallels 38° 58' as basis, the temperature of the north is in excess over that of the south. This isotherm of the mean atmospheric temperature reaches over sea so far north as to embrace those seas which may be called the Mediterranean . . . it reaches on land to 47° 50' - 3° 56', where the temperature of Genoa in 43° 51' N. lat. is 15°7 C., and that of Alais 44° 10' N. lat. is 15°4 C. Beyond this isotherm, or beyond the bases of 38° 58' lat., the difference between north and south decreases [which implies that the temperature at the south gets gradually warmer than at the north, chiefly in longitudes examined by Dr. Hann]. . . . At the isotherms of 1°666 C., of which that at the south is quite maritime, and almost without curving, the equilibrium of temperature between south and north is re-established, the isotherms coincide, each in its mean, in both hemispheres, with their parallels or bases, they divide the hemispheres in proportion 1 : 4.78 . . ."

O. REICHENBACH

Sea-shore Alluvion—the "Chesil"

GREATER attention and speculation have been bestowed on this than any other of our marine littoral moles, the Transactions of various societies abounding in papers describing it, and as the westernmost of our south coast beaches, within the limits of the narrow seas, may well terminate a review thereof.

Leland, Camden, Lambarde, and Holinshed, all describe it, and how it fluctuates in quantity dependent on the wind. Leland used the word "Chesil" (which became a proper name as applied to this particular bank) as a general term, descriptive of shingle banks, throughout his work. Lilly, who wrote in 1715, describes it most accurately. Hutchins calls it "Steepstone," and derives its name from "Ceorl," the Saxon for gravel. Gough adopts the same derivation, calling it "a prodigious heap of pebbles thrown up by the sea, beginning at Chesilton, in Portland, and reaching beyond Swyre, 16½ miles."

The most remarkable feature is the top "full" about fifteen feet above the lower ones at the Portland end forming a huge seaward wall or mole, exceeding anything of the kind to be seen along our coasts, the land-slope of which is flat. At the east end it is thirty to forty feet above high water of springs, gradually lowering westward, and the stones decreasing in size. The land-locked tidal lake, the "Fleet," between it and the main, is another feature so common to these formations; it terminates opposite the valley to Abbotsbury, down which runs a small mill-stream. Between Lord Ilchester's castle and the Abbotsbury Coastguard Station the great beach ceases, the high terminating in low tertiary cliffs, which intercept the top "full," the lower "fulls" continuing of an average height, as at Deal and elsewhere; two to three miles west of Abbotsbury the beach is thrown up into very sharp slopes, which, from the fineness of the material, become very solid, and continues to decrease in size and altitude, intercepted by the cliffs at Burton, and again formed into a moderate "full" on each side of Bridport harbour. The great elevation attained by the eastern end of this bank, where it abuts against the Island of Portland, exhibits an exceptional accumulation of water-driven material in the hollow of, and to the north-east of the Great West Bay,

which bears, with seamen, the ugly name of "Dead Man's Bay," from an embayed vessel caught in a south-west gale seldom escaping shipwreck. More than half a century back, Fleet was inundated from a breach in the beach, and the church washed down, and many houses in Chesilton destroyed.

It is said locally, that the material is so finely graduated, that a native boatman or fisherman can tell in the darkest night the exact locality his boat may come ashore or be beached on, by picking up a handful of the gravel. In a south-west gale it is next to impossible to stand on the eastern crest, from the rain of pebbles projected over its summit by the breaking waves.

The Chesil is shown with great accuracy in early manuscript maps, especially in a remarkable series of drawings collected by the great Cecil, well known at the British Museum as "Lord Burleigh's Book;" also in drawings by Collins and Lilly. From these it would appear, that two or three centuries back the "Fleet" was wider, leading to the inference that the beach had retreated landward; but a close inspection of the bank does not support this conclusion, but appears to show that the surplus material is driven in heavy weather right over the crest sloping towards the "Fleet," the area of which has been narrowed and reduced by this continued process.

The gradation of material here again shows the ultimate leeward movement from west to east, due to preponderance of winds from the first quarter; the altitude from three to four times that of the normal elevation of ordinary English beaches above high water; also the upper plateau above the usual neap and spring "fulls" are striking features, showing its abnormal character.

The largest shingle travelling to leeward and to the summit, is illustrative of the accumulative energy of the heavier projectiles, and their being less acted on by the recoil than the smaller materials.

It may be well to notice here the soundings taken in H.M.S. *Beagle*, between Santa Cruz and the Falkland Islands, referred to by the late Mr. Darwin in his work "Geological Observations," published in 1876, and which he truly describes as presenting the usual phenomena in such cases. The material quickly and regularly decreasing in size with increased depth and distance from shore, under two miles out large and small pebbles were found intermixed.

Miles.	Depth, fathoms.	
At 2 to 4 ...	11 to 12 ...	Pebbles size of walnuts and smaller.
4 to 7 ...	17 to 19 ...	Do. size of hazel nuts.
10 to 11 ...	23 to 25 ...	$\frac{3}{16}$ " to $\frac{1}{8}$ " ms. diameter.
12 ...	30 to 40 ...	$\frac{1}{16}$ " diameter.
22 to 150 ...	45 to 65 ...	$\frac{1}{16}$ " do. to fine sand.

This is confirmatory of, or supported by, observations around our own coasts.

J. B. REDMAN

6, Queen Anne's Gate, Westminster, S.W., June 10

Meteor

ON Wednesday, June 7, 9.45 p.m. G.M.T., at a station 396 yards north-west by west of the transit-circle of the observatory, Mr. W. H. Robinson's attention was attracted by the sudden appearance of a fine meteor about 3° below Mars, which passed through a point 5° below Regulus, and, continuing its course about 12° further, finally disappeared. Almost instantly after being first seen, it shone very brightly, then assumed a train of detached luminous beads, and towards the end of its path burst, presenting an appearance similar to the bursting of a rocket. Its greatest brilliancy was equal to Venus. The length of the whole track was about 25°, and the time of visibility of the train was about five seconds.

E. J. STONE

Radcliffe Observatory, Oxford, June 8

Earthquakes in Naples

THE seismographs of the Vesuvian Observatory and of the Naples University have shown increased activity the last two days. This culminated this morning at 6.47 a.m. in a distinct shock seven seconds duration, direction north to south, chiefly undulatory, but elevatory towards the end. From these facts Prof. Palmieri considered it to come from a distance, and not of local origin. This was proved by telegrams from Isernia and Vinchiatiuro in the Apennines. All to-day the amount of vapour from Vesuvius is much more abundant, and this evening it is

brilliant; the quantity of lava flowing is increased. This is a good example on a small scale of seismic activity having its focus in a mountain chain affecting the neighbouring volcanoes.

Naples, June 6

H. J. JOHNSTON-LAVIS

THE "POLYPHEMUS"

HER MAJESTY'S ship *Polyphemus*, which has been five years under construction, is now being prepared for her final trials. She contains so many peculiarities of design and novelties of various kinds in her machinery and fittings that much scientific interest attaches to her performances. Her form is different from that of any other ship ever built. The part above water has been described as resembling a cylinder floating on its side and deeply immersed, which is tapered at the ends to form a bow and stern. An idea of her appearance above water may be obtained by imagining such a cylinder to be flattened over a large portion of its area to form a deck, and to float at a height of 4 feet 6 inches out of water. The whole of the exposed part of this surface, which has great curvature near the water line, and enters the water at an angle of about 45 degrees, is plated over with steel armour, which is carried some distance below water. The curvature of the sides is continued to a depth of several feet below the water line, and from this point they turn sharply in and converge towards each other at the keel almost in straight lines. A cross section of the vessel is similar to a pegtop, which is floating in water at a depth below its greatest breadth, and the emerged part of which presents a convex surface only. Upon this form of hull an iron superstructure is mounted, which carries a hurricane deck from which the ship is worked, and to which the openings into the main body of the ship are carried up. Two protected coverings are fitted on this deck, one at each end, which are connected with the structure of the hull, and give means of communication with the interior. There are three revolving turrets on each side, which are each armed with one of the heaviest Nordenfolt guns. This superstructure may all be shot away without injuring the vessel or impairing her powers, except as regards the use of the Nordenfolt guns.

The lines of the ship are very fine, and have been determined chiefly with a view to great speed. The armour plating is very light; no heavy guns are carried; many devices have been adopted to reduce the weight of the machinery; and some of the main fighting qualities of most other men-of-war have been sacrificed, in order that a high speed may be realised. The speed she was designed for is 17 knots; although with the great amount of horse-power; for her size, she is intended to indicate, a higher speed might be expected if it is efficiently utilised. The offensive weapons of the *Polyphemus* consist of the ram and torpedo. She will carry no guns except six Nordenfolt machine-guns, which will each be carried in a projecting turret at the height of the flying deck. These will serve to repel boat attack; but for offensive operations against powerful vessels, she will only be able to employ the ram and torpedoes. The successful use of these weapons will depend primarily upon speed. High speed is essential, to prevent failure in ramming; and in using torpedoes under heavy gun-fire, it is very important to be able to approach an enemy quickly, and to get away again with all possible celerity, as the contingencies of this mode of fighting may require. The efficiency of the *Polyphemus* thus being a question of speed, it will be understood why so many sacrifices have been made in order to enhance this quality. The vessel has been constructed as light as possible throughout, and saving of weight has been carried to a great extent.

The hull is built of mild steel; the frames being of Bessemer, and the bottom plating of Landore-Siemens steel. There is a double bottom, and the hold of the ship is largely divided into separate watertight compart